Bloomington/Monroe County
Metropolitan Planning Organization

Crash Report

Calendar Years 2003 through 2006

August 2007

BLOOMINGTON • MONROE COUNTY
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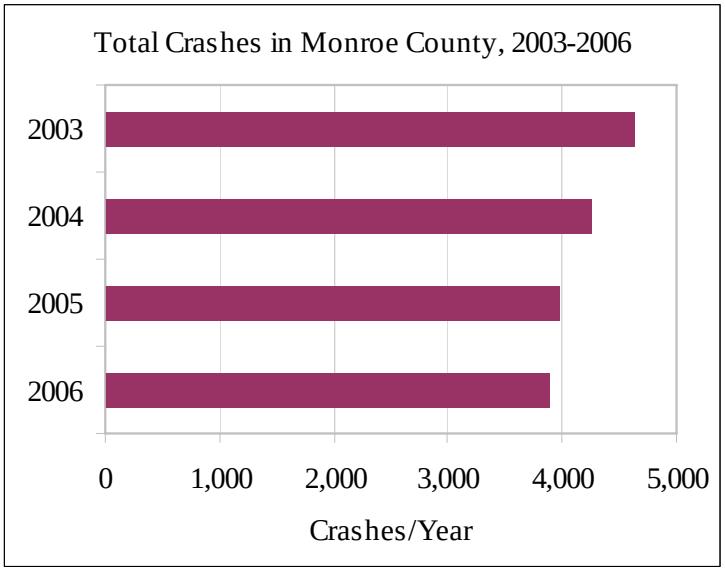
Executive Summary

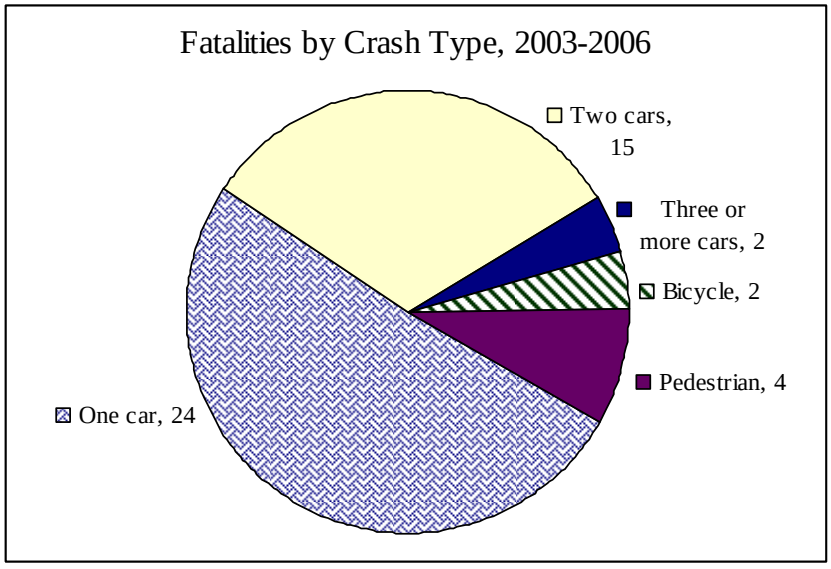
The 2006 Bloomington/Monroe County MPO Crash Report provides insight into the causes and trends of motor vehicle crashes in Monroe County from 2003 to 2006. The report demonstrates that motor vehicle crashes contribute to a significant loss of life, property, and productivity in Monroe County. However, some notable improvements have occurred over the past few years, and with a better understanding of crash trends, targeted infrastructure investments should further improve safety on roads within Monroe County.

A total of 16,759 motor vehicle crashes were reported between 2003 and 2006. These included 2,766 single-car crashes, 1,065 crashes involving three or more vehicles, 152 involving a bicyclist, and 311 involving a pedestrian. The remainder of crashes (12,465) were two-car collisions. While the overall number of crashes declined each year from 2003 to 2006, 15 fatalities occurred in 2006 – more than in any other year in the study period. In total, 47 motor vehicle fatalities occurred from 2003 to 2006.



The timing of crashes during the study period followed a predictable pattern, where the greatest number occurred during weekday rush hours. Between 4:00 P.M. and 6:00 P.M. on weekdays, an average of slightly more than one crash occurred per hour. Timing of crashes on the weekend followed a more even distribution, with a greater number occurring in the late evening/early morning hours, compared to during the week. Friday consistently had the highest crash frequency, while Sunday had the lowest number of crashes.

The intersection of State Road 37 and Vernal Pike continued to be the most problematic intersection in the county, averaging around 50 crashes per year. Other corridors which had a significant number of crashes include 10th Street, 3rd Street, State Road 45/46 Bypass, State Road 37, and Walnut Street. Certain intersections not only resulted in a large number of crashes, but also had a high crash frequency relative to traffic volume. These include: State Road 37 & Vernal Pike, 17th Street & Fee Lane, Bloomfield Road & State Road 37, Country Club Drive & Walnut Street, 3rd Street & Jordan Avenue, and 10th Street & Jordan Avenue, among others. These intersections should be prioritized for safety improvements, where feasible.



The leading cause of crashes during the study period was failure to yield right of way. Other driver errors, such as disregard for regulation and unsafe speeds, were also significant. The leading cause of fatal crashes was the scenario where the driver ran off the right side of the road. Such crashes accounted for 10 out of 43 fatal crashes (23%) from 2003 to 2006. Alcohol was the primary factor in 12% of fatal crashes, while other factors such as speed (9%), failure to yield right of way (7%), and disregard for regulations (7%) were also significant. Safety improvements such as guard rails and rumble strips, as well as enforcement measures could result in reduced fatalities.

Out of 47 motor vehicle fatalities that occurred from 2003 to 2006, 24 resulted from single-car crashes. Two-car crashes resulted in 15 fatalities, while only two fatalities were attributable to crashes involving three or more cars. Bicycle and pedestrian crashes accounted for two and four fatalities, respectively.

In keeping with national trends, males were much more prone to being fatally injured in motor vehicle crashes than females, accounting for almost 70% of fatalities during the study period. Drivers 16 to 20 years old and 35 to 44 years old were also overly represented in fatal crashes compared to total crashes.

Bicycle and pedestrian crashes are an important consideration in Bloomington and Monroe County due to a relatively high number of non-motorized trips in the area, and the sensitivity to injury of individuals using these modes. Compared to other types of crashes, those involving bicyclists and pedestrians were much more likely to result in a fatality or incapacitating injury. For instance, 1.3% of bicycle and pedestrian crashes resulted in fatality compared with 0.23% of motorized vehicle crashes.

Bicycle and pedestrian crashes tend to be concentrated near Indiana University and downtown Bloomington. Corridors with relatively high numbers of non-motorized crashes include Jordan Avenue, Fee Lane, 10th Street, the State Road 45/46 Bypass, 3rd Street, College Avenue, and Walnut Street. However, several of the fatal crashes involving bicyclists and pedestrians occurred outside of these areas, along arterials or highways.

Introduction

Increased mobility has been a defining aspect of life in the United States and around the world for the past several decades. Investment in transportation infrastructure has led to new opportunities for trade, travel, recreation, relocation, and economic growth. However, the effectiveness of our transportation system is undermined by human, economic, and financial costs attributable to motor vehicle crashes.

Motor vehicle crashes are a significant cause of death, injury, property loss and productivity loss in the United States. In 2004, motor vehicle crashes were the 8th leading cause of death overall, and the leading cause for groups 15-34 years of age.[1] While it may not be possible to completely eliminate motor vehicle crashes, gaining a better understanding of their causes can help transportation planners and engineers to reduce their frequency and severity. This report attempts to characterize the motor vehicle crashes in Monroe County, Indiana, providing the basis for informed transportation policies and infrastructure investments.

The report uses two time periods for analysis: 2006 and 2003-2006. Data from 2006 alone is used to give a "snapshot" of crash statistics in Monroe County, while data from 2003 to 2006 is used to illustrate trends. Additionally, it is often necessary to consider a longer time horizon (2003-2006) where data from a single year appear to be random. This is typically the case for bicycle and pedestrian crashes, fatalities and incapacitating injuries, and location analysis, where the number of crashes or individuals is relatively small. Due to changes in the state's data system, it is not possible to compare current crash characteristics with those prior to 2003.

The findings of the report have been compiled to provide information to the Citizen's Advisory Committee, Technical Advisory Committee, and Policy Committee of the MPO. Additionally, the report will be available to local government agencies, Indiana University, and the general public through the MPO website and the office of the Bloomington Planning Department.

Methodology and Data Considerations

The data for the Bloomington/Monroe County Crash Report originates from the "Automated Report and Information Exchange System" (ARIES) of the Indiana State Police. This system contains crash data from police reports since 2003. The police report data is organized by collisions, units (vehicles), and individuals. These entities are related to one another based on the collision, but can also be analyzed independently. It is possible to retrieve information regarding collisions (e.g., where and when did the greatest number of crashes occur?), vehicles involved (e.g., how many crashes involved bicycles?), and individuals involved (e.g., how old were the crash victims?). It is also possible to perform more complex analyses using attributes from each of these entities (e.g., which location had the most fatalities?).

As with any database, the validity of conclusions resulting from the data is contingent upon accurate and complete data entry. Lack of information from hit-and-run collisions, confusion surrounding alternate names of roads (e.g., Country Club Drive, Winslow Road), misspelled or misentered street names, and incomplete data entry may have introduced some error into the results. Therefore, results should not be interpreted rigidly.

A significant effort was made to correct data errors and validate results. The most problematic source of error in the database was related to crash locations. To address such errors, several steps were taken. First, street names and suffixes were examined and corrected where misspelled or incorrect. Following this, a consistent naming scheme was applied to intersections that may be referenced by multiple names. For example, the intersection of Country Club Drive & Walnut Street could also be considered as Walnut Street & Winslow Rd, since Country Club Drive becomes Winslow Road at

[1] Centers for Disease Control, National Center for Injury Prevention and Control. 10 Leading Causes of Death, United States, 2004. http://webappa.cdc.gov/cgi-bin/broker.exe . Accessed on April 24, 2007.

Walnut Street. To further complicate matters, some police reports might incorrectly list the same intersection as Old State Road 37 & Country Club Dr, since Walnut Street becomes Old State Road 37 further south of this intersection. Establishing a consistent naming scheme for intersections was required to appropriately summarize crash locations.

In certain cases, nonexistent intersections were listed (e.g., Rhorer Road & State Road 37). In these situations, if there was an obvious implied meaning (Rhorer Road & Old State Road 37), then the data was corrected; otherwise, the data could not be used for location analysis.

Once the data was corrected, collisions were categorized for analysis based on the type and severity of the crash. If the crash included a bicyclist or pedestrian, it was classified as a "bicycle" or "pedestrian" crash, accordingly, regardless of the number of vehicles involved. If the crash involved only motor vehicles, the "crash type" classification was based on the number of cars: one car, two cars, or three or more cars. The "severity" classification of a collision was based on the most severe injury that resulted from the crash. For example, if a crash resulted in a fatality as well as a non-incapacitating injury, the severity of the crash was classified as "Fatal Injury."

Most other data methods used in the report are self-explanatory. However, the section dealing with the number of crashes per million entering vehicles (MEV rate) requires further explanation. This section uses crash data along with traffic volume data to compare the frequency of crashes with the amount of traffic at an intersection. Locations with high traffic volumes are expected to have more crashes than locations with low traffic volumes. The MEV rate provides a normalized comparison of crash frequency across intersections.

There are two data components required to calculate the MEV rate. The first component is the number of crashes at an intersection in a given year. The ARIES system provides this data, as described above. The second component is the number of vehicles entering the intersection. Obtaining this data is more difficult. Transportation professionals generally rely on traffic counts and modeling techniques to estimate traffic along any stretch of road. For this report, traffic volume estimates from the Bloomington/Monroe County Travel Demand Model were used. The Travel Demand Model is part of the MPO's 2030 Transportation Plan, and provides a comprehensive estimate of traffic volumes in Monroe County. Although the Model may contain some inaccurate traffic estimates, it does provide a consistent basis for comparing crash rates across intersections and years. Actual traffic counts are not available for many intersections of interest.

Average Daily Traffic (ADT) estimates from the Bloomington/Monroe County Base Year 2000 Travel Demand Model were recorded for every street segment abutting one of the 25 intersections with the greatest number of crashes in Monroe County in 2006. As the model estimates are for year 2000, it was necessary to adjust them to more accurately reflect travel patterns in years 2003-2006. To accomplish this, INDOT statewide adjustment factors were used. For example, to estimate traffic for 2005, estimates from 2000 were multiplied by 1.068. Adjustments for 2006 were the same as those used for 2005 because, at the time of writing, INDOT had not produced adjustment factors for 2006.

The estimates from the Travel Demand Model include traffic entering and leaving an intersection. Since the MEV rate is only concerned with the number of vehicles entering the intersection, ADT estimates of these street segments were summed and divided by two to get the number of daily vehicles entering the intersection. This number was multiplied by 365 to obtain the *annual number of vehicles entering the intersection*, for comparison with the *annual number of crashes*. The MEV rate for an intersection was calculated by multiplying the *annual number of crashes* by one million and dividing this number by the *annual number of vehicles entering the intersection*: *(Annual number of crashes * 1,000,000) / (Annual number of vehicles entering the intersection).*

When reading the report, it is important to understand the distinction between "crashes" and "individuals." The term "crash" is used when the characteristics of the crash itself are under consideration, whereas the terms "individual" and "fatality" are used when the focal point is the people involved. For example, the "Fatal Injury" column of Table 1 ("Crash Occurrence by Type and Severity, 2003-2006") shows how many crashes resulted in a fatal injury in 2006, but it would be incorrect to interpret this column as the number of fatalities in 2006, since more than one fatality can result from a single crash.

Analysis

Overview
This section provides a summary of crash characteristics in Monroe County, including the type and severity of crashes from 2003-2006. These factors reflect trends in the overall safety of the transportation system.

In 2006, a total of 3,893 motor vehicle crashes were reported in Monroe County (Table 1). Of these, 12 resulted in one or more fatalities, while 68 caused incapacitating injuries. For the vast majority of crashes, injuries were not reported. Two-car crashes were the most common, comprising 73% of the total. One-car crashes and those involving three or more cars were also common, accounting for 17% and 6% of total crashes reported, respectively. Pedestrian and cyclist crashes were much less frequent.

The overall number of crashes decreased each year from 2003 to 2006, falling from 4,630 to 3,893 – a decline of about 16%. However, the portion of crashes resulting in fatalities or incapacitating injury was higher in 2006 than in the three previous years, mostly due to increased severity of single-vehicle crashes. The number and severity of bicycle and pedestrian crashes varied significantly from year to year.

Table 1. Crashes by Type and Severity, 2003-2006

	Crash Type	Severity				Annual Total	Percent of Annual Total
		Fatal Injury	Incapacitating Injury	Non-Incapacitating Injury	No Injury/ Unknown		
2003	One car	6	15	190	572	**783**	**16.9%**
	Two cars	2	31	555	2,862	**3,450**	**74.5%**
	Three or more cars	0	5	115	183	**303**	**6.5%**
	Bicycle	1	5	25	5	**36**	**0.8%**
	Pedestrian	1	4	44	9	**58**	**1.3%**
	Annual Total	**10**	**60**	**929**	**3,631**	**4,630**	
	Percent of Annual Total	**0.2%**	**1.3%**	**20.1%**	**78.4%**		
2004	One car	3	13	204	412	**632**	**14.8%**
	Two cars	7	28	785	2,434	**3,254**	**76.3%**
	Three or more cars	1	4	122	134	**261**	**6.1%**
	Bicycle	0	4	29	1	**34**	**0.8%**
	Pedestrian	1	4	57	24	**86**	**2.0%**
	Annual Total	**12**	**53**	**1,197**	**3,005**	**4,267**	
	Percent of Annual Total	**0.3%**	**1.2%**	**28.1%**	**70.4%**		
2005	One car	3	17	248	409	**677**	**17.1%**
	Two cars	3	18	654	2,229	**2,904**	**73.2%**
	Three or more cars	1	7	128	115	**251**	**6.3%**
	Bicycle	1	4	19	4	**28**	**0.7%**
	Pedestrian	1	4	44	60	**109**	**2.7%**
	Annual Total	**9**	**50**	**1,093**	**2,817**	**3,969**	
	Percent of Annual Total	**0.2%**	**1.3%**	**27.5%**	**71.0%**		
2006	One car	10	23	222	419	**674**	**17.3%**
	Two cars	1	21	603	2,232	**2,857**	**73.4%**
	Three or more cars	0	10	96	144	**250**	**6.4%**
	Bicycle	0	4	34	16	**54**	**1.4%**
	Pedestrian	1	10	39	8	**58**	**1.5%**
	Annual Total	**12**	**68**	**994**	**2,819**	**3,893**	
	Percent of Annual Total	**0.3%**	**1.7%**	**25.5%**	**72.4%**		
	4-Year Total	**43**	**231**	**4,213**	**12,272**	**16,759**	
	Percent of Total	**0.3%**	**1.4%**	**25.1%**	**73.2%**		

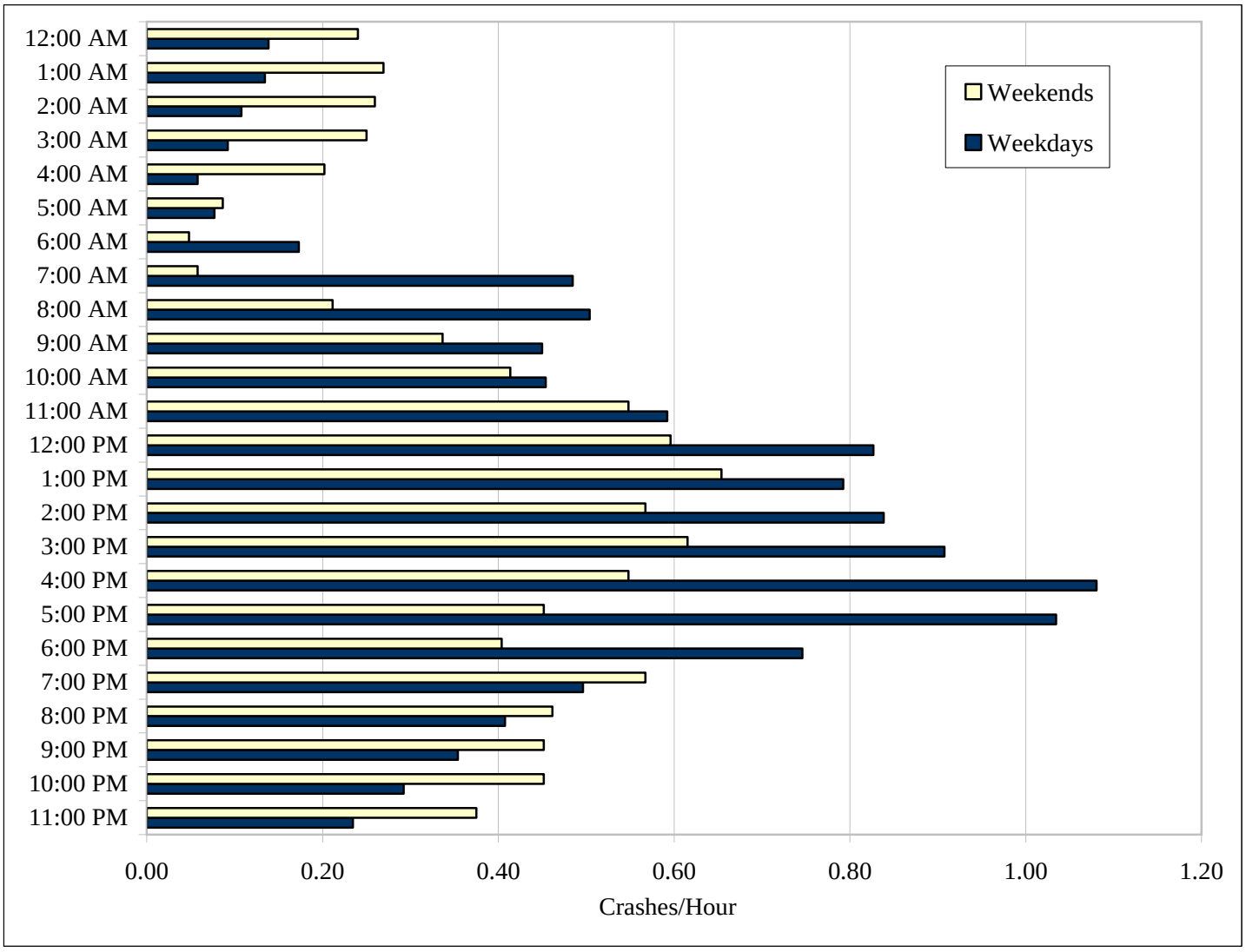
Time of Crashes

This section summarizes the number of crashes by hour and day. Information relating to the timing of crashes can be used by law enforcement agencies for preparatory measures. Additionally, decisionmakers may use this information in an attempt to reduce peak crash times.

On weekdays in 2006, the number of crashes typically increased in conjunction with traffic from the morning and noon rush hours – 7:00 AM to 9:00 AM, and 12:00 PM to 1:00 PM (Figure 1).[2] Hourly crashes also increased progressively from 1:00 PM until around 5:00 PM. The late afternoon was the most likely time for a crash to occur, with roughly one per hour.

The hourly distribution of crashes for the weekend was less varied than for the work week. Crashes in the late evening and early morning were much more common during the weekend, and rush hour peaks were not as prevalent as on weekdays.

Figure 1. Total Crashes by Time of Day, 2006 [3]

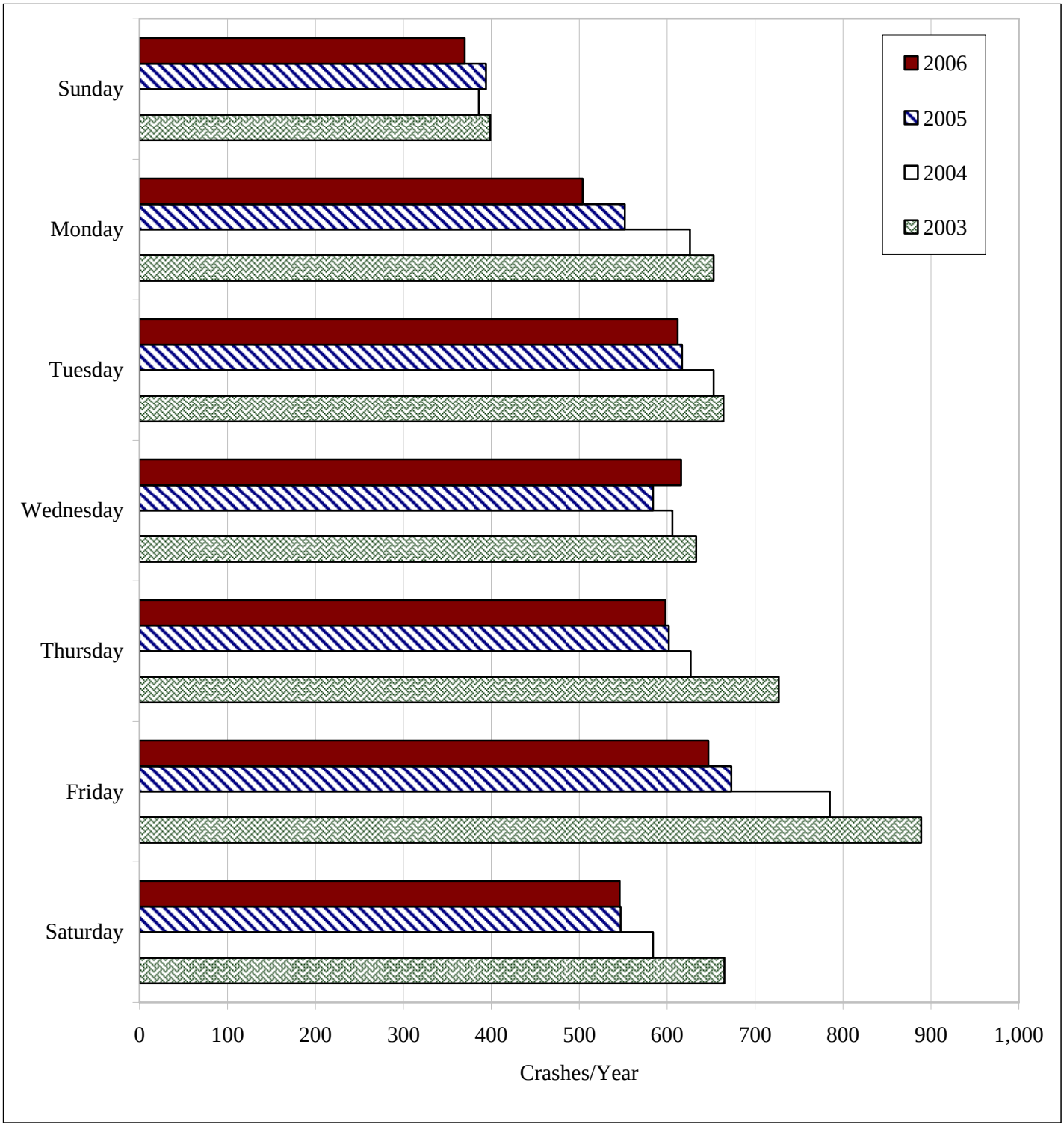


[2] For the purposes of this report, "weekdays" begin on Sunday at 7:00 PM and end on Friday at 6:59 PM. Conversely, "weekends" begin on Friday at 7:00 PM and end on Sunday at 6:59 PM.

[3] Hours shown represent the beginning of the hour. For example, "12:00 AM" represents the time period from 12:00 AM to 12:59 AM.

During the study period, a greater number of crashes occurred on Fridays than on any other day (Figure 2). This is probably attributable to typical weekday crashes as well as crashes associated with weekend activities.

Figure 2. Crashes by Day of Week, 2003-2006



Crash Locations
This section addresses the spatial distribution of crashes in Monroe County, highlighting problematic intersections and corridors. Transportation planners and engineers use this information to prioritize infrastructure projects for safety improvements.

In 2006, the intersection with the greatest number of total crashes was State Road 37 & Vernal Pike, where 52 crashes occurred (Table 2). An aerial photo of this intersection is provided for reference in the appendix.

Corridors with particularly high crash counts include 10th Street, 3rd Street, State Road 45/46 Bypass, State Road 37, and Walnut Street.[4] These streets carry high volumes of traffic, which tends to lead to a greater number of crashes. Intersection design factors, such as limited visibility, topographic constraints, and awkward turning movements, may also contribute to greater crash frequency at some intersections.

Table 2. Total Crashes by Location, 2006

Rank	Location	Annual Total
1	State Road 37 & Vernal Pike	**52**
2	10th Street & State Road 45/46 Bypass	**39**
3	Bloomfield Road & State Road 37	**38**
4	Country Club Drive & Walnut Street	**30**
5	10th Street & Jordan Avenue	**29**
6	3rd Street & State Road 45/46 Bypass	**29**
7	3rd Street & Liberty Drive	**26**
8	3rd Street & State Road 37	**26**
9	State Road 45/46 Bypass & Walnut Street	**25**
10	3rd Street & Smith Road	**23**
11	3rd Street & Jordan Avenue	**22**
12	Grimes Lane & Walnut Street	**20**
13	10th Street & Fee Lane	**19**
14	Gordon Pike & Walnut Street	**18**
15	Eastgate Lane & State Road 45/46 Bypass	**18**
16	State Road 37 & Victor Pike	**18**
17	3rd Street & College Avenue	**18**
18	3rd Street & Gates Drive	**18**
19	Atwater Avenue & Henderson Street	**18**
20	8th Street & College Avenue	**18**
21	17th Street & Fee Lane	**17**
22	3rd Street & Pete Ellis Drive	**17**
23	3rd Street & Indiana Avenue	**17**
24	Liberty Drive & State Road 45	**15**
25	Old State Road 37 & State Road 37	**15**

[4] Crash locations that did not occur at an intersection were excluded from consideration for this section. For example, locations identified in the database as "3rd Street" could have occurred in any number of places along the 3rd Street corridor and therefore can not be precisely attributed to a specific location.

Many of the intersections that were problematic in 2006 have been associated with higher crash frequency for several years. For instance, the intersection of State Road 37 & Vernal Pike is consistently the worst intersection in Monroe County in terms of the overall number of crashes, averaging approximately 50 crashes annually (Table 3; see appendix Figure A1 for a corresponding map of total crashes by location and Figure A4 for an aerial photo of State Road 37 & Vernal Pike).

Table 3. Total Crashes by Location, 2003-2006

Rank	Location	Year				4-Year Total
		2003	2004	2005	2006	
1	State Road 37 & Vernal Pike	50	50	47	52	**199**
2	Bloomfield Road & State Road 37	44	46	46	38	**174**
3	3rd Street & State Road 45/46 Bypass	50	43	36	29	**158**
4	Country Club Drive & Walnut Street	41	35	41	30	**147**
5	10th Street & State Road 45/46 Bypass	33	36	36	39	**144**
6	3rd Street & State Road 37	33	49	35	26	**143**
7	State Road 45/46 Bypass & Walnut Street	32	42	18	25	**117**
8	3rd Street & Jordan Avenue	23	29	39	22	**113**
9	10th Street & Jordan Avenue	25	27	28	29	**109**
10	3rd Street & Liberty Drive	21	29	32	26	**108**
11	3rd Street & Curry Pike	24	31	27	10	**92**
12	3rd Street & Gates Drive	24	32	18	18	**92**
13	3rd Street & Smith Road	15	26	16	23	**80**
14	10th Street & College Avenue	21	15	27	11	**74**
15	17th Street & Fee Lane	26	19	12	17	**74**
16	3rd Street & Kingston Drive	8	29	20	12	**69**
17	13th Street & Indiana Avenue	17	21	14	15	**67**
18	Atwater Avenue & Henderson Street	16	17	16	18	**67**
19	State Road 37 & Tapp Road	13	20	17	14	**64**
20	3rd Street & Washington Street	16	21	13	13	**63**
21	Leonard Springs Road & State Road 45	15	16	18	14	**63**
22	10th Street & Fee Lane	17	18	8	19	**62**
23	3rd Street & College Avenue	22	10	12	18	**62**
24	3rd Street & Pete Ellis Drive	15	17	12	17	**61**
25	Dillman Road & State Road 37	20	15	12	14	**61**

In addition to the total number of crashes, the frequency of crashes compared to the number of vehicles entering the intersection is an important consideration. This allows the crash tendency of intersections to be compared without the influence of traffic volume. In 2006, the intersection of 13th Street & Indiana Avenue had the worst crash rate from this perspective, with close to five crashes per million vehicles entering the intersection (Table 4, appendix Figures A2, A5).[5]

[5] The Crashes per Million Entering Vehicles Rate (MEV) is calculated as follows: *(Annual number of crashes * 1,000,000) / (Average Daily Traffic*365).* Average Daily Traffic was obtained using the Bloomington/Monroe County Travel Demand Model.

Several intersections that are significant in terms of total crash occurrences also have high MEV rates, including State Road 37 & Vernal Pike, Bloomfield Road & State Road 37, Country Club Drive & Walnut Street, 3rd Street & Jordan Avenue, and 10th Street & Jordan Avenue

Intersections with high crash frequency relative to traffic volume often have significant design flaws. In the case of 13th Street & Indiana Avenue, for example, the railroad bridge over Indiana Avenue limits visibility leading up to the intersection. The intersection at 17th Street & Fee Lane also exhibits poor design, including misalignment of abutting street segments and visibility constraints attributable to topography.

Table 4. Crashes per Million Entering Vehicles by Location, Ranked by 4-Year Average, 2003-2006

Rank	Location	Year				4-Year Average
		2003	2004	2005	2006	
1	13th Street & Indiana Avenue	4.76	5.95	3.96	4.24	**4.73**
2	17th Street & Fee Lane	4.66	3.44	2.17	3.08	**3.34**
3	Bloomfield Road & State Road 37	3.28	3.47	3.46	2.86	**3.27**
4	Country Club Drive & Walnut Street	3.22	2.78	3.25	2.38	**2.91**
5	3rd Street & Jordan Avenue	2.21	2.83	3.80	2.14	**2.75**
6	State Road 37 & Vernal Pike	2.47	2.50	2.34	2.59	**2.48**
7	10th Street & Jordan Avenue	1.97	2.15	2.23	2.31	**2.17**
8	3rd Street & Indiana Avenue	2.68	1.55	1.03	2.19	**1.86**
9	Atwater Avenue & Henderson Street	1.72	1.85	1.74	1.96	**1.82**
10	8th Street & College Avenue	1.46	1.23	2.34	2.22	**1.81**
11	3rd Street & Smith Road	1.31	2.30	1.41	2.03	**1.76**
12	10th Street & Fee Lane	1.82	1.95	0.87	2.06	**1.68**
13	3rd Street & Liberty Drive	1.21	1.69	1.87	1.52	**1.57**
14	3rd Street & State Road 37	1.36	2.04	1.46	1.08	**1.49**
15	10th Street & State Road 45/46 Bypass	1.32	1.45	1.45	1.57	**1.45**
16	3rd Street & State Road 45/46 Bypass	1.81	1.58	1.32	1.06	**1.44**
17	3rd Street & College Avenue	1.64	0.76	0.91	1.36	**1.17**
18	3rd Street & Gates Drive	1.17	1.57	0.88	0.88	**1.13**
19	State Road 45/46 Bypass & Walnut Street	1.20	1.59	0.68	0.95	**1.11**
20	Liberty Drive & State Road 45	0.35	0.98	1.43	1.34	**1.03**
21	3rd Street & Pete Ellis Drive	0.91	1.04	0.74	1.04	**0.93**
22	Eastgate Lane & State Road 45/46 Bypass	1.01	0.84	0.72	1.08	**0.91**
23	Grimes Lane & Walnut Street	0.67	0.99	0.55	1.23	**0.86**
24	Old State Road 37 & State Road 37	0.83	0.77	0.54	1.15	**0.82**
25	State Road 37 & Victor Pike	0.49	0.57	0.57	1.27	**0.73**

Crash Factors

This section summarizes the primary crash factors from 2003 to 2006. An understanding of these causes informs infrastructure investments, enforcement activities, and educational efforts. For instance, unsafe speeds can be addressed by traffic enforcement and road design, while the tendency of motorists to drive off the road can be mitigated with a guardrail or rumble strips. Similarly, enforcement and education could reduce the number of crashes attributable to alcohol.

Failure to Yield Right of Way was the most common cause of crashes during the study period, contributing to almost 4,000 crashes from 2003 to 2006. Other driver errors such as disregard for regulations, following too closely, and running off the road were also significant. Table 5 shows the top 10 primary crash factors for 2003-2006, which account for almost two-thirds of total accidents.

Driving under the influence of alcohol does not contribute to as many crashes as the more common driver errors, but such crashes tend to be more severe. From 2003 to 2006, five fatalities and 25 incapacitating injuries were attributable to alcoholic beverages.

Table 5. Total Crashes by Severity and Primary Factor, 2003-2006

Rank	Primary Factor	Severity				4-Year Total
		Fatal Injury	Incapacitating Injury	Non-Incapacitating Injury	No Injury/ Unknown	
1	Failure to yield right of way	3	53	2,698	1,087	**3,841**
2	Following too closely	0	15	1,390	542	**1,947**
3	Unsafe backing	0	1	1,252	73	**1,326**
4	Disregard for signal or regulatory sign	3	11	466	307	**787**
5	Unsafe speed	4	18	360	237	**619**
6	Improper turning	0	2	480	67	**549**
7	Ran off road right	10	19	333	169	**531**
8	Roadway surface condition	0	5	347	98	**450**
9	Alcoholic beverages	5	25	245	158	**433**
10	Driver distracted	0	3	262	132	**397**

Fatalities

This section provides a focused look at motor vehicle fatalities in Monroe County from 2003 to 2006. This information provides critical insight into the nature of fatal crashes and the victims of these crashes. As with previous sections, the material presented here can be useful for enforcement, education, and decision-making.

In 2006, there were 15 fatalities in Monroe County as a result of 12 motor vehicle crashes (Table 6). Of these, 11 resulted from single-car crashes, three from 2-car crashes, and one from a crash involving a pedestrian.

Over the period from 2003 to 2006, the average annual number of fatalities per 100,000 residents was 9.68 for Monroe County. This figure is well below the U.S. and Indiana averages of around 14.5.[6,7] In 2005, Monroe County had the third lowest fatalities per 100,000 ranking among Indiana counties. This fact may be attributable to relatively safe roads, lower driving rates, or reduced traffic during summer months.

Table 6. Fatalities by Crash Type, 2003-2006

Year	Crash Type					Annual Total	Fatalities per 100,000 Population
	One car	Two cars	Three or more cars	Bicycle	Pedestrian		
2003	7	2	0	1	1	**11**	**9.13**
2004	3	7	1	0	1	**12**	**9.92**
2005	3	3	1	1	1	**9**	**7.41**
2006	11	3	0	0	1	**15**	**12.23**
Total	**24**	**15**	**2**	**2**	**4**	**47**	**9.68**

Out of the 47 fatal crash victims from 2003 to 2006, 32 were male and 15 were female (Figure 3). About 43% of all fatalities were males in single-car crashes.

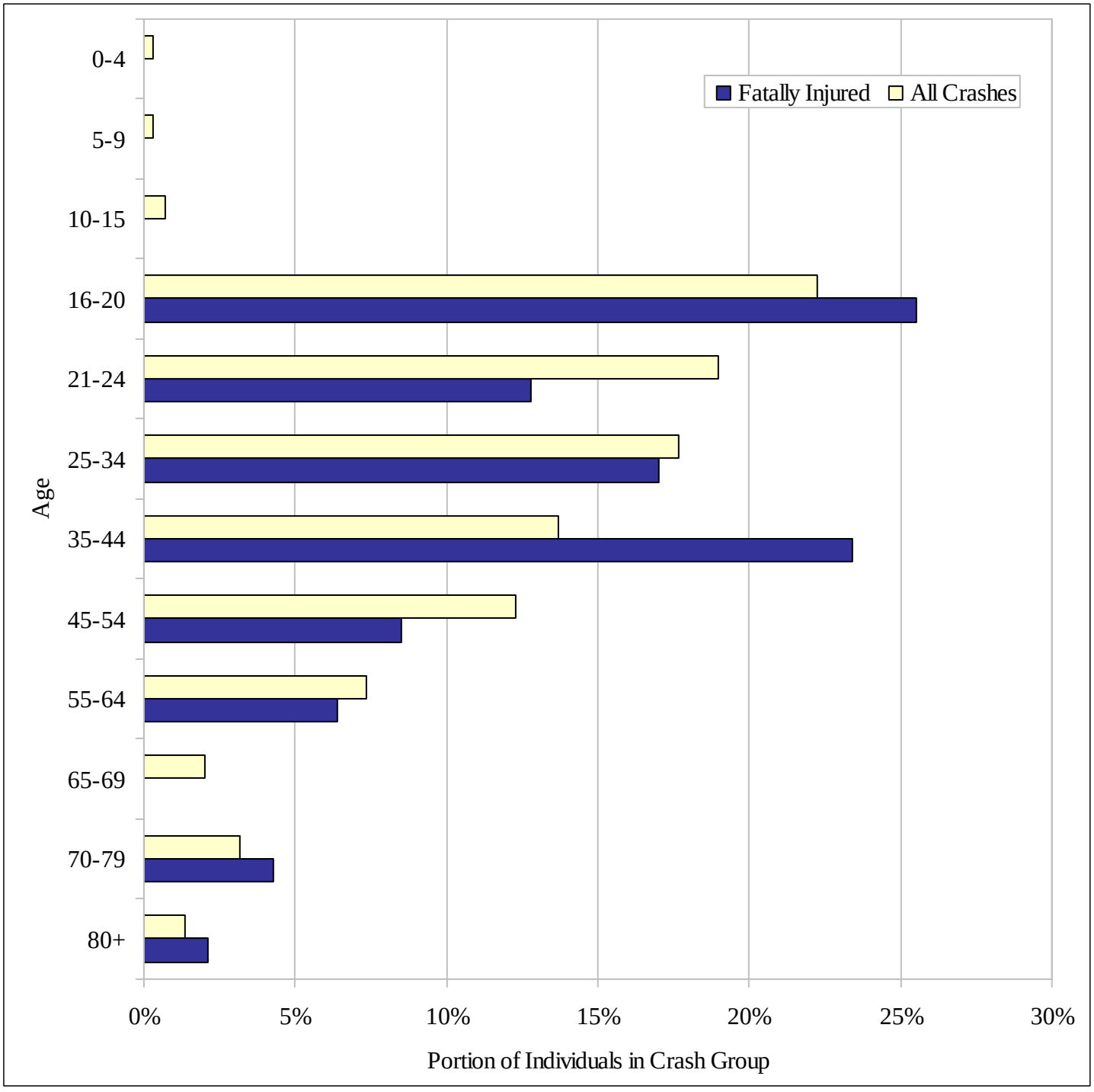
Figure 3. Fatalities by Gender and Crash Type, 2003-2006

[6] U.S. Department of Transportation, National Center for Statistics & Analysis. Fatality Analysis Reporting System, Web-Based Encyclopedia. http://www-fars.nhtsa.dot.gov/ Accessed on April 10, 2007

[7] Indiana Department of Transportation. Office of Roadway Safety and Mobility. Highway Crash Data by County for Indiana. September 29, 2006.

From 2003 to 2006, Monroe County teenagers were involved in a greater number of crashes than any other age group. They were also disproportionately likely to be fatally injured in a motor vehicle crash. For instance, individuals 16-20 years of age comprised 22% of all individuals involved in a crash and 26% of fatalities (Figure 4). The 35-44 year age class showed an even greater discrepancy, as those individuals accounted for only 14% of total crash victims, but 24% of fatalities. The elderly population also shows a greater tendency to be fatally injured when involved in a crash.

Figure 4. Portion of Individuals in All Crashes and Individuals Fatally Injured, by Age Class, 2003-2006 [8]



[8] For the purposes here, individuals whose age was not reported were excluded from the total number of individuals.

Bicycle and Pedestrian Crashes

This section reports on the number of bicycle and pedestrian crashes in Monroe County from 2003 to 2006. Such crashes are an important consideration in Bloomington and Monroe County due to a relatively high number of non-motorized trips in the area. For instance, the 2000 U.S. Census reported that 2.7% of commuters in Bloomington use a bicycle as their primary mode of transportation, while 14.5% walk. By comparison, 0.3% of Indiana commuters reported bicycling and 2.4% reported walking as their primary modes. In addition, individuals using these modes of transportation are particularly sensitive to injury.

In 2006, there were 54 reported crashes involving a cyclist and 58 involving a pedestrian (Table 7; Figure A3). Of these, one pedestrian was fatally injured, while four bicycle and 10 pedestrian crashes resulted in incapacitating injury.

Over the period from 2003 to 2006, 463 pedestrian and bicycle crashes were reported, resulting in four pedestrian fatalities, and two cycling fatalities. A relatively high number of bicycle and pedestrian crashes resulted in injury, compared with other crash types. Whereas only 0.2% of crashes involving only motor vehicles resulted in fatality, 1.3% of bicycle and pedestrian crashes resulted in fatality. Similarly, 1.2% of motorized crashes resulted in incapacitating injury compared to 8.4% for bicycle and pedestrian crashes.

Table 7. Bicycle and Pedestrian Crashes by Type and Severity, 2003-2006

	Crash Type	Severity				Annual Total
		Fatal Injury	Incapacitating Injury	Non-Incapacitating Injury	No Injury/ Unknown	
2003	Bicycle	1	5	25	5	36
	Pedestrian	1	4	44	9	58
	Annual Total	**2**	**9**	**69**	**14**	**94**
2004	Bicycle	0	4	29	1	34
	Pedestrian	1	4	57	24	86
	Annual Total	**1**	**8**	**86**	**25**	**120**
2005	Bicycle	1	4	19	4	28
	Pedestrian	1	4	44	60	109
	Annual Total	**2**	**8**	**63**	**64**	**137**
2006	Bicycle	0	4	34	16	54
	Pedestrian	1	10	39	8	58
	Annual Total	**1**	**14**	**73**	**24**	**112**
	4-Year Total	**6**	**39**	**291**	**127**	**463**
	Percent of 4-Year Total	**1.3%**	**8.4%**	**62.9%**	**27.4%**	

Over the past several years, Jordan Avenue has emerged as a problematic corridor for pedestrians and cyclists, as illustrated in Table 8. Four out of five of the top bicycle and pedestrian crash locations are along Jordan Avenue between 3rd Street and 10th Street. From 2003 to 2006, five bicycle and seven pedestrian crashes occurred at the intersection of 3rd Street & Jordan Avenue (Figure A6), while 7th Street & Jordan Avenue, and Jones Avenue & Jordan Avenue each had seven combined bicycle and pedestrian crashes. The intersection of 10th Street & Jordan Avenue was also problematic, with five crashes during the same time period.

Other corridors with relatively frequent non-motorized crashes include 10th Street, Fee Lane, the State Road 45/46 Bypass, 3rd Street, College Avenue, and Walnut Street.

Table 8. Bicycle and Pedestrian Crashes by Location, Ranked by Total Occurrence, 2003-2006

Rank	Location	Crash Type		Annual Total
		Bicycle	Pedestrian	
1	3rd Street & Jordan Avenue	5	7	**12**
2	7th Street & Jordan Avenue	4	3	**7**
3	Jones Avenue & Jordan Avenue	1	6	**7**
4	10th Street & Fee Lane	1	4	**5**
5	10th Street & Jordan Avenue	2	3	**5**
6	10th Street & State Road 45/46 Bypass	2	3	**5**
7	17th Street & Fee Lane	2	3	**5**
8	3rd Street & Gates Drive	1	4	**5**
9	3rd Street & State Road 45/46 Bypass	0	5	**5**
10	10th Street & Woodlawn Avenue	0	4	**4**
11	3rd Street & State Road 37	0	4	**4**
12	Kirkwood Avenue & Walnut Street	2	2	**4**
13	11th Street & Fee Lane	3	0	**3**
14	17th Street & Walnut Grove	0	3	**3**
15	19th Street & Walnut Street	3	0	**3**
16	1st Street & Walnut Street	2	1	**3**
17	3rd Street & Hawthorne Drive	2	1	**3**
18	3rd Street & Jefferson Street	0	3	**3**
19	3rd Street & Liberty Drive	1	2	**3**
20	3rd Street & Walnut Street	2	1	**3**
21	3rd Street & Washington Street	0	3	**3**
22	4th Street & Walnut Street	1	2	**3**
23	6th Street & College Avenue	1	2	**3**
24	8th Street & College Avenue	1	2	**3**
25	8th Street & Walnut Street	0	3	**3**

Compared to the overall number of cyclist and pedestrian crashes, those resulting in fatalities tend to occur at highway intersections or along other major arterials (Table 9).

Table 9. Bicycle and Pedestrian Fatalities by Location, 2003-2006

Location	Accident Type	
	Bicycle	Pedestrian
11th Street & Fairview Street	1	0
3rd Street & Walnut Street	1	0
Arlington Road & State Road 46	0	1
Gordon Pike & Walnut Street	0	1
Harding Place Drive & Old State Road 37	0	1
May Road & Rockport Road	0	1

Conclusion

This report has demonstrated a number of meaningful trends relating to motor vehicle crashes in Monroe County. The information should inform transportation decision-making and, ultimately, lead to a safer, more efficient transportation system.

Some problem areas noted in the report are already in the process of being addressed. For example, the City of Bloomington recently applied for and received Hazard Elimination & Safety (HES) funding from INDOT to improve the intersection of 17th Street & Fee Lane, which had the second highest MEV rate in the county and the 15th highest number of total crashes from 2003 to 2006. Similarly, long range plans indicate a need to improve or replace the intersection at Vernal Pike & State Road 37.

Other deficiencies noted in the report suggest new priorities for infrastructure improvements. For instance, it is clear that Jordan Avenue is a problematic corridor for bicyclists and pedestrians. While some of the bicycle and pedestrian accidents along Jordan Avenue are attributable to a greater amount of non-motorized travel, other factors such as bicycle and pedestrian amenities, pedestrian crossing distance, and driver awareness should also be considered.

Identifying priorities for safety improvements is an important aspect of this report. However, future versions of the Crash Report should develop another potentially instructive byproduct of the crash data – evaluation. For example, we would expect that the number of crashes at 17th Street & Fee Lane will decline following intersection improvements in 2008 or 2009. Analyzing crash trends before and after road improvements could help to demonstrate the success or failure of an infrastructure project.

Future versions of this report might also be strengthened by a more detailed analysis of the circumstances of fatal crashes and the characteristics of individuals involved in fatal crashes. For example, it would be instructive to consider the time distribution of fatal crashes, what types of cars were involved, for which age groups alcohol was involved, etc. An improved understanding of these factors would help the community to better focus its efforts on reducing motor vehicle fatalities. A more thorough comparison of Monroe County with other counties, as well as state and national averages would also strengthen this report.

Appendix

Figure A1. Total Crashes by Location, 2003-2006

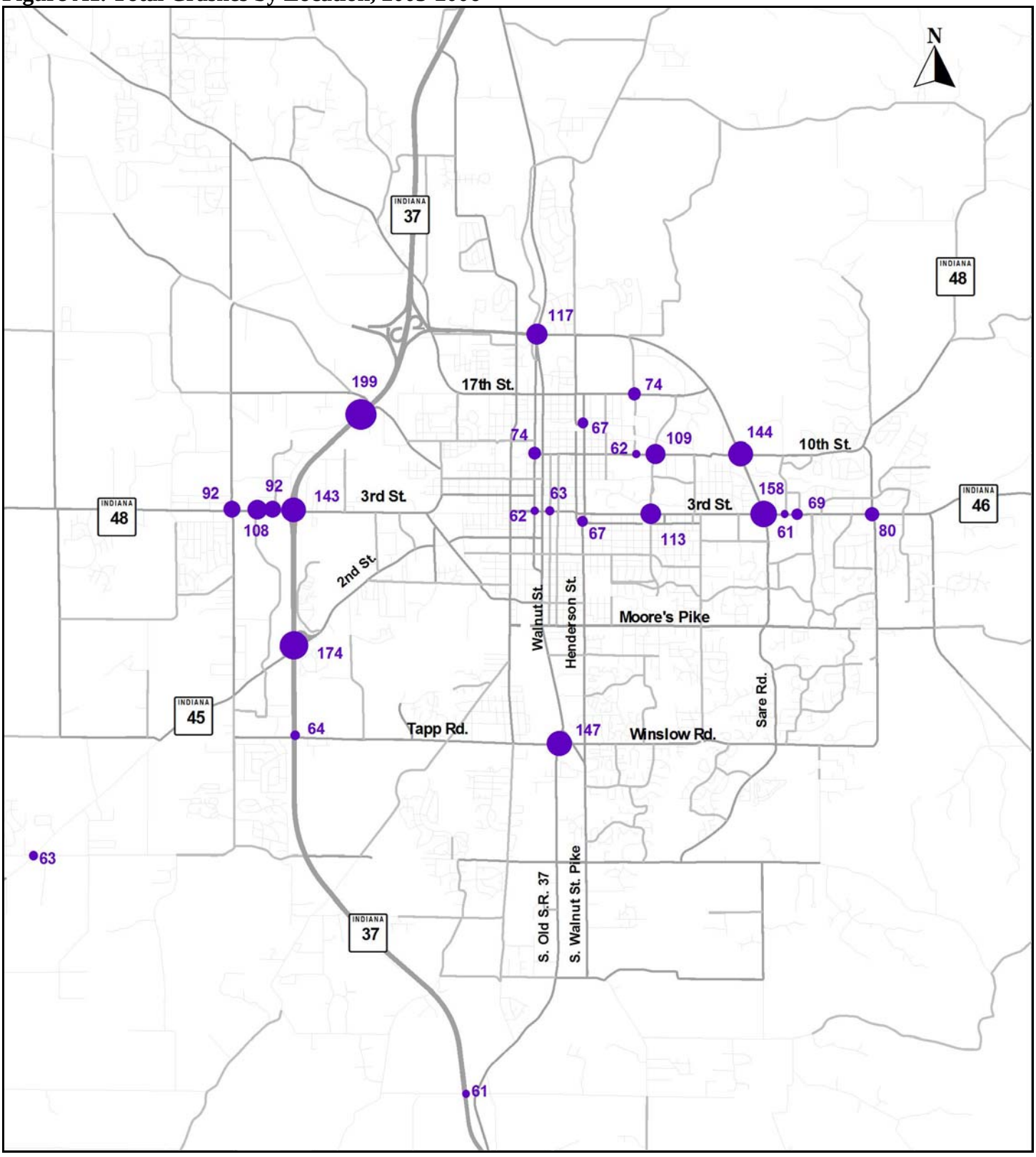


Figure A2. MEV Rate by Location, 2003-2006

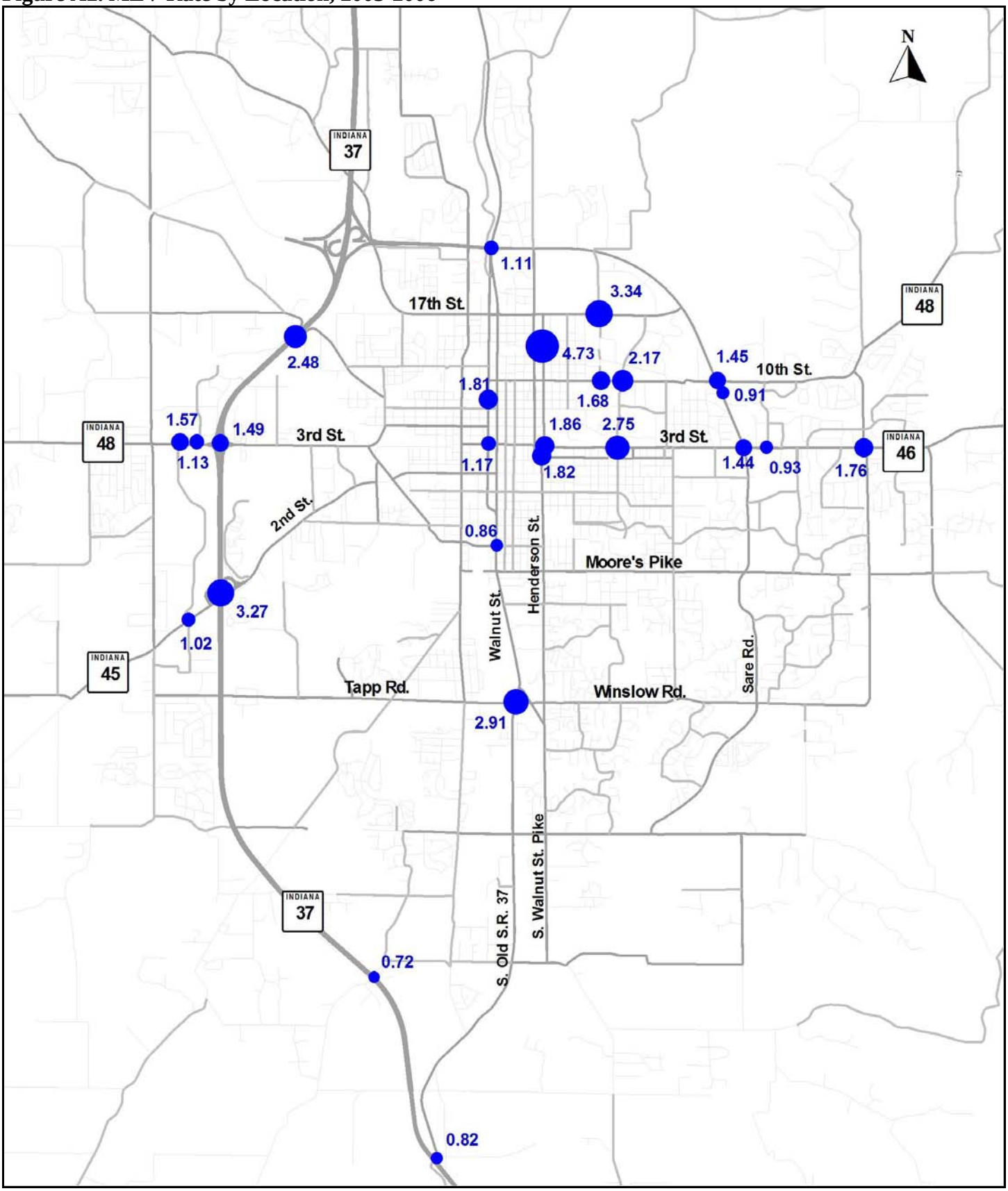
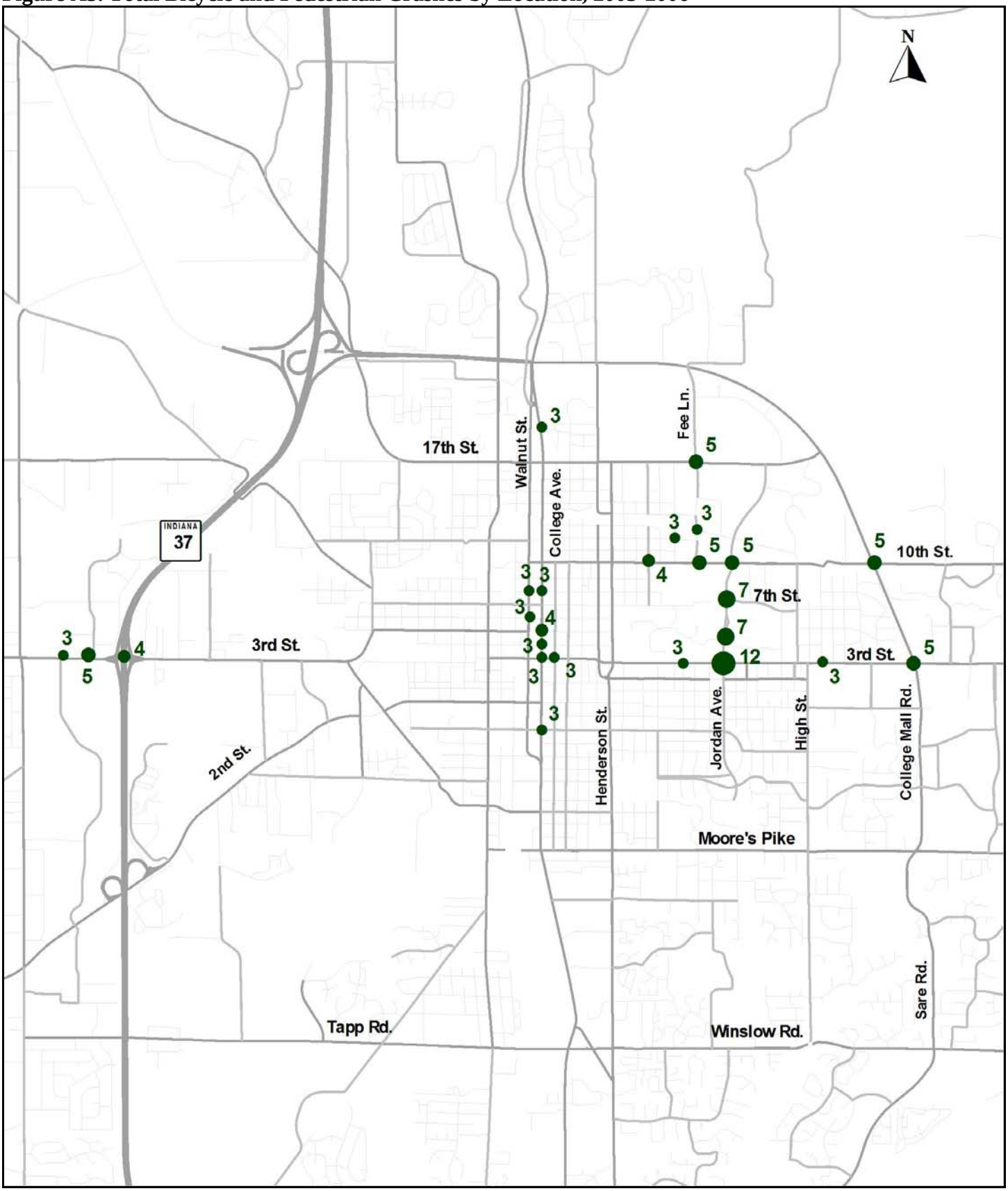
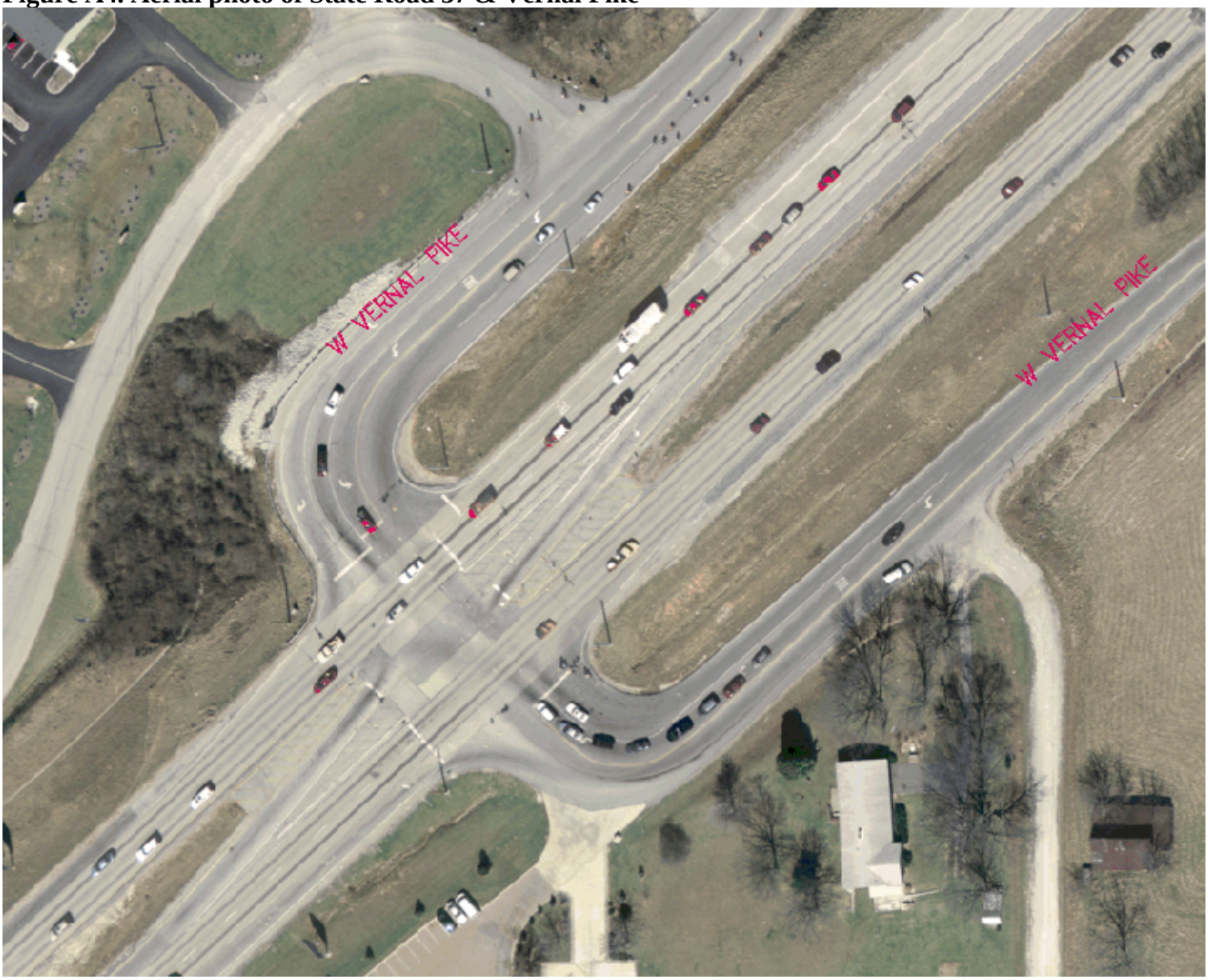


Figure A3. Total Bicycle and Pedestrian Crashes by Location, 2003-2006



The intersection of State Road 37 & Vernal Pike consistently has the greatest number of annual crashes of any intersection in Monroe County, as well as the sixth highest MEV rate in Monroe County. The volume of traffic is an important factor in the number of crashes, as is the design of the intersection. In particular, the intersection approaches from Vernal Pike on either side of State Road 37 lead to poor visibility and require drivers to focus on elements other than the activity in the intersection. The 2030 Long Range Transportation Plan includes plans to extend 17th St. to State Road 37, which would provide a safer means of accessing State Road 37 compared to Vernal Pike.

Figure A4. Aerial photo of State Road 37 & Vernal Pike



The intersection at 13th Street & Indiana Avenue has the highest crash rate relative to traffic volume. Poor sight lines attributable to the railroad bridge over Indiana Avenue are probably the leading factor. The 2030 Long Range Transportation Plan includes plans to extend Dunn Street south from 13th Street to provide an alternative route to downtown. This would significantly reduce the amount of traffic at the intersection of 13th Street & Indiana Avenue, potentially leading to lower MEV rates.

Figure A5. Aerial photo of 13th Street & Indiana Avenue

The intersection at 3rd Street & Jordan Avenue has the highest number of bicycle and pedestrian crashes. Significant bicycle and pedestrian traffic associated with Indiana University along with substantial motor vehicle traffic create the potential for a high number of crashes at this intersection. Poorly defined sidewalks, lack of separation between sidewalks and motorized traffic, lack of bike lanes, and a significant number of drive cuts probably contribute to the high number of bicycle and pedestrian crashes.

Figure A6. Aerial photo of 3rd Street & Jordan Avenue